

What is claimed is:

1. A method of spectroscopically analyzing a material sample, the method comprising:
  - generating a plasma;
  - generating a loop current so as to generate a magnetic field, wherein the plasma is confined within the magnetic field;
  - introducing atoms of the material sample into the plasma wherein excited sample atoms are confined; and
  - analyzing characteristic features of the excited sample atoms.
2. The method as set forth in Claim 1 wherein generating a loop current comprises generating a sinusoidally alternating electric current.
3. The method as set forth in Claim 2 wherein generating a sinusoidally alternating electric current comprises generating a radio frequency electric current.
4. The method as set forth in Claim 1 wherein analyzing characteristic features of the excited sample atoms comprises analyzing the spectral composition or mass-to-charge ratio of the excited sample atoms.
5. The method as set forth in Claim 1 further comprising electrically grounding the loop current.
6. The method as set forth in Claim 2 wherein generating a loop current comprises generating a planar loop current.

7. The method as set forth in Claim 6 wherein the loop defines an aperture.
8. The method as set forth in Claim 6 wherein generating a loop current comprises generating a plurality of loop currents.
9. The method as set forth in Claim 8 wherein generating a plurality of loop currents comprises generating a plurality of parallel or antiparallel loop currents separated by a prescribed distance.
10. The method as set forth in Claim 9 wherein the alternating electric current in a first loop current flows in a direction opposite to that of the alternating electric current in a second loop current during alternating half cycles of the sinusoidally alternating current.
11. The method as set forth in Claim 7 further comprising adjusting an area of the aperture.
12. The method as set forth in Claim 9 further comprising adjusting the prescribed distance.
13. A spectroscopic system comprising:
  - a loop current having an associated magnetic field;
  - a plasma confined within the magnetic field;
  - a material sample of excited atoms within the plasma;
  - a spectrometer for analyzing characteristic features the excited atoms.
14. The spectroscopic system as set forth in Claim 13 further comprising an electric power generator for generating the loop current.

15. The spectroscopic system as set forth in Claim 14 wherein the loop current is a sinusoidally alternating electric current.
16. The spectroscopic system as set forth in Claim 15 wherein the sinusoidally alternating electric current is a radio frequency current.
17. The spectroscopic system as set forth in Claim 13 wherein the loop current is a planar current.
18. The spectroscopic system as set forth in Claim 13 wherein the loop current defines an aperture.
19. The spectroscopic system as set forth in Claim 13 wherein the loop current comprises a plate.
20. The spectroscopic system as set forth in Claim 13 wherein the loop current comprises a plurality of plates.
21. The spectroscopic system as set forth in Claim 17 wherein the plurality of plates are parallel.